Anesthesia for gastrointestinal endoscopy: A subspecialty in evolution?

After the invention of nitrous oxide and public demonstration of ether, the specialty of anesthesia evolved to address one thing-"render the patient pain free," while the surgeon operated. Development of the endotracheal tube by Sir Ivan Magill ushered in the era of a closed system anesthesia. Newer inhalational agents and muscle relaxants introduced the concept of balanced anesthesia. Subsequent decades were devoted to tailoring anesthesia to address specific sub groups, resulting in subspecialties such as cardiac anesthesia, neuroanesthesia, and pediatric anesthesia. Until recently, sedation for gastrointestinal (GI) endoscopic procedures was largely provided by the endoscopist (gastroenterologist or the surgeon, as the case may be), with occasional help from the anesthesiologist. However, the last decade has seen significant developments in this area, which has unwrapped both opportunities and challenges to the anesthesiologist.[1] The time tested general anesthesia and airway management techniques are largely considered "overkill" in GI endoscopy; thus, endotracheal intubation, or laryngeal mask airway is mainly for rescue and inhalational anesthesia is impractical.

Gastrointestinal endoscopic procedures have outnumbered most medical procedures, at least in the United States of America (USA). Even in the university hospitals, providing anesthesia services for GI endoscopic procedures is a growing commitment.[2] However, research in this area is limited and guidelines from major societies are not available. How does providing anesthesia for GI endoscopy differ from the mainline specialty?

First, although the depth of sedation during these procedures is similar to general anesthesia, the airway is largely unprotected. Used as a sedative, propofol, the most popular agent used for these procedures has a narrow therapeutic window-transiting from mild sedation to deep general anesthesia rapidly. GI endoscopic procedures are largely performed in remote locations of major hospitals or free standing endoscopy centers and the quality of help and support available may not be of the same standard as an operating suite. The patient and procedure turnover is high, requiring anesthetic's residual effect to wear off rapidly. Although, the majority belongs to American Society of Anesthesiology (ASA) class I-II, patients with significant co-morbidity are presenting on a regular basis, especially at major hospitals. With advancements in technology, the length and complexity of the procedures has increased; thus, enhancing the need for higher anesthesia depth.

Second, the challenges faced by the anesthesiologist while sedating these patients are unique, both for upper GI endoscopy and colonoscopy. While maintaining the patency of the upper airway, preserving spontaneous ventilation and suppressing the cough reflex are important for upper GI endoscopy, preserving the gag reflex is vital during colonoscopy. Majority of the sedation related complications during upper GI endoscopy are airway related. The reported incidence of hypoxemia depends on the procedure, patient co-morbidity, and the airway management technique. Not surprisingly, the frequency of cardiac arrest during upper GI endoscopy has been reported to be higher than either regional anesthesia or general anesthesia. During colonoscopy, aspiration of gastric contents seems to be the most important sedation related complication, although both perforation and bleeding are more common during propofol sedation.

Finally, anesthesia providers have developed a multitude of techniques using existing drugs and devices to address these challenges. Propofol administered as a bolus followed by an infusion is the commonest technique. Addition of a short acting opioid suppresses coughing; however, might increase the risk of apnea. Yet, on the balance, careful titration of propofol with a short acting opioid like fentanyl or remifentanil is preferable. Preoxygenation is very important, especially for upper endoscopies including e*ndoscopic retrograde cholangiopancreatography* (ERCP). It can provide extended "safe apnea time," in case of airway difficulties. Propofol should be administered after endoscopist is ready to introduce the endoscope. Dosing time should be such that the peak clinical effect should coincide with endoscope insertion. This practice reestablishes spontaneous ventilation if the patient was apneic. Insertion of a nasal airway to administer

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supplemental oxygen via a mapleson breathing system is a routine practice in some centers and has contributed to a significant reduction in the rates of hypoxemia. Continuous and careful monitoring is paramount. Monitoring of end tidal carbon dioxide, although recommended by the ASA (during sedation procedures) is unreliable during upper GI endoscopy. Suitable gas sampling device is currently unavailable. Careful observation of chest movement and the use of alternate means of ventilation monitoring like acoustic respiratory monitor or impedance pneumogram will improve safety. Due to the shape of the oxygen dissociation curve, valuable minutes could be lost by placing excessive reliance on the pulse oximeter. The patient could be apneic, yet pulse oximeter can display 100% saturation. Many advanced endoscopic procedures can be safely conducted with this technique; however, endotracheal intubation might be a safer option in the hands of inexperienced, especially for procedures like ERCP and single balloon or double balloon enteroscopy.[3]

Colonoscopy is relatively less challenging. However, patients have to be warned of the risks of aspiration. Increased abdominal pressure due to excessive of gas insufflation, altering patient's position, manual application of pressure to overcome technical difficulties might increase the risk of aspiration. Yet, preserving upper airway reflex affords protection against aspiration.

Research to find new and safer drugs is necessary. Remimazolam, a newer short acting benzodiazepine might address some of the short comings of propofol.[4] Airway management and monitoring issues are other areas. Some physicians in the USA and Europe are guiding the administration of propofol by nurses. Sedasys, a device capable of administering propofol (meant for nonanesthesia providers) was recently approved by Federal Drug Administration. Unless the anesthesia providers take the lead in providing safe sedation for both routine and advanced endoscopic procedures, our role in this important area could be challenged.

In conclusion, providing anesthesia for GI endoscopy is more unique than many other subspecialties in anesthesia. Setting guidelines and establishing standards is important for the growth of this rapidly expanding area.

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